SHUAI ZHOU

Junior undergraduate student, South China University of Technology, Guangzhou, China
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RESEARCH INTERESTS

Multi-Agent/Robot Systems, Heuristic Search, Motion Planning

EDUCATION

SOUTH CHINA UNIVERSITY OF TECHNOLOGY　　　　　　　　　　Sep 2022 — Jun 2026 (Expected)
Bachelor of Engineering in Robotics, Guangzhou, China　　　*Cumulative GPA: 3.85/4.00, Rank: 5/56*

Core curriculum: Artificial Intelligences and technologies, Robotics theory and technology, Design and Manufacture.

UNIVERSITY OF CALIFORNIA, BERKELEY　　　　　　　　　　　　　　Aug 2023 — Dec 2023
Exchange Student, Berkeley, United States　　　　　　　　　　　*Cumulative GPA: 4.00/4.00*

Core curriculum: Data Structures, Designing information devices and Systems I, Introduction to Solid Mechanics.

ACADEMIC EXPERIENCE

CARNEGIE MELLON UNIVERSITY, ARCS Lab　　　　　　　　　　　　Apr 2025 — Present
Research Intern, Pittsburgh, United States　　　　　　　　　*Supervised by Prof Jiaoyang Li*

- Co-lead research on an anytime planner for Multi-Agent Path Finding (MAPF) with deadlines and kinematic constraints.
- Combine deadline-aware heuristics with learning-based execution models to adapt MAPF to real-world scenarios.
- Design, implement (C++), and evaluate planning algorithms in both simulation and on physical mobile robots.

UNIVERSITY OF CALIFORNIA, IRVINE, IDM Lab　　　　　　　　　　Mar 2025 — Present
Collaboration via RAP Lab, Irvine, United States　　　　　　　*Supervised by Prof Sven Koenig*

- Lead research on an anytime planner for Multi-Agent Path Finding with Asynchronous Actions (MAPF-AA).
- Enhance large neighborhood search with congestion-aware heuristics to improve solution refinement.
- Design, implement (C++), and evaluate algorithms in grid-based simulation; lead the writing of the research paper.

SHANGHAI JIAO TONG UNIVERSITY, RAP Lab　　　　　　　　　　　Apr 2024 — Present
Research Intern, Shanghai, China　　　　　　　　　　　*Supervised by Prof Zhongqiang Ren*

- Led research on a scalable planner for Multi-Agent Path Finding with Asynchronous Actions (MAPF-AA).
- Planned for 1,000 robots using rule-based strategies and extended to a general search framework with provable optimality.
- Designed, implemented (C++), and evaluated algorithms in grid-based simulation; analyzed theoretical properties such as completeness; led the writing of the research paper.
- One first-author paper accepted by **AAAI 2025** and one extended abstract accepted by **SoCS 2025**.

PUBLICATIONS

LSRP*: Scalable and Anytime Planning for Multi-Agent Path Finding with Asynchronous Actions
<u>Shuai Zhou</u>, Shizhe Zhao, Zhongqiang Ren　　　　　— **Submitted to Artificial Intelligence (AIJ)**
Extended Abstract: `https://shuaizhou302.github.io/uploads/SOCS25_LSRPSTAR.pdf`　　　— **In SoCS 2025**

- Main Contributions: This paper extends the previously proposed LSRP algorithm to an anytime version and is the first method capable of finding optimal solutions for Multi-Agent Path Finding with Asynchronous Actions (MAPF-AA). Given a reasonable amount of computation time, the proposed approach can efficiently handle instances with up to 1,000 agents, achieve near-optimal solutions, and eventually converge to the optimal one. This approach serves as a search framework that can easily incorporate other planners as shortcuts while retaining guarantees of eventual optimality.

Loosely Synchronized Rule-Based Planning for Multi-Agent Path Finding with Asynchronous Actions
<u>Shuai Zhou</u>, Shizhe Zhao, Zhongqiang Ren　　　　　　　　　　　　　　— **In AAAI 2025**
Paper: `https://doi.org/10.1609/aaai.v39i14.33618` | Code: `https://github.com/rap-lab-org/public_LSRP`

- Main Contributions: This paper proposes a novel approach to Multi-Agent Path Finding with Asynchronous Actions, focusing on scalability over optimality. By integrating search-based (LSS) and rule-based (PIBT) planning, the proposed approach efficiently computes unbounded sub-optimal solutions for large-scale problems. Experiments demonstrate its ability to handle $10\times$ more agents than baselines with only 25% longer makespan.

SERVICE

Reviewer: IROS 2025

SKILLS

- **OS**: Windows, Linux(Ubuntu)
- **Programming Languages**: Python, C/C++, Java, HTML,MATLAB
- **Languages**: Chinese (native), English (fluent)
- **Additional Courses**
    - CMU: 10301/601 Introduction to Machine Learning
    - CMU: 16-782 Planning and Decision-making in Robotics
    - Coursera: Robotics: Computational Motion Planning
    - Coursera: Robotics: Aerial Robotics

AWARDS

Outstanding Visiting Student Scholarship from USIEA   Guangzhou, China
Awarded to the top student in the UC Berkeley Global program; received 6,000 CNY   Mar 2024

Merit Student of South China University of Technology   Guangzhou, China
Top student in the Robotics Engineering major, Class of 2022   Feb 2024

The Third Prize Scholarship by South China University of Technology   Guangzhou, China
Top 10% of students, receiving 10,000 CNY   Dec 2023

Exchange Student Scholarship from South China University of Technology   Guangzhou, China
Awarded to outstanding students for overseas exchange, receiving 40,000 CNY   Jul 2023

REFERENCES

Prof. Jiaoyang Li
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Prof. Sven Koenig
Chancellor's Professor and Bren Chair, University of California, Irvine
E-mail: sven.koenig@uci.edu
Department: Donald Bren School of Information and Computer Science

Prof. Zhongqiang Ren
Assistant Professor, Shanghai Jiao Tong University
E-mail: zhongqiang.ren@sjtu.edu.cn
Department: University of Michigan - Shanghai Jiao Tong University Joint Institute, Automation

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